



ISCE Docker Tools: Automated Radiometric Terrain Correction and image co-registration of UAVSAR MLC data

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User provides

UAVSAR
MLC

Real	Complex
$S_{hh}S_{hh}^*$	$S_{hh}S_{hv}^*$
$S_{hv}S_{hv}^*$	$S_{hh}S_{vv}^*$
$S_{vv}S_{vv}^*$	$S_{hv}S_{vv}^*$

Analysis

e.g.

- time series
- area statistics
- classification

run_ctrl.py

Automated workflow

0_ann_dem.py

Pre-ISCE steps

e.g.

- get DEM (e.g. SRTM, ALOS)
- convert to ISCE frames

ISCE MLC Stacks

Create co-registered stack of images

1_isce_stack.py

For one pol, e.g. HHHH

- Forward geom. for master ('topo.py') -> lat/lon/hgt/inc
- Reverse geom. for slave ('geo2rdr.py') -> offsets

2_resamp_pol.py

For every pol, slave:

Resample according to offsets using SINC interpolation

ISCE RTC Stacks

Stack
postprocessing

e.g.

3_uavsar_pp_mlc.py

- magnitudes
- geocoding

Radiometric Terrain Correction

3_uavsar_pp_mlc.py

- NORMLIM approach (e.g. Small 2011)
- Calculate γ_0



Directory Structure

On my system, <localdir> = D:\docker_sar

Manage superstore (D:)

Share View Drive Tools

> This PC > superstore (D:)

Name	Date modified	Type	Size
0_NASA_FT	11/4/2019 1:19 PM	File folder	
0_SMAP_FT_NAT_ROAD	8/26/2018 9:57 PM	File folder	
agu19	11/24/2019 5:08 AM	File folder	
all_pictures	7/13/2019 7:57 AM	File folder	
Anaconda3	11/24/2019 11:27 AM	File folder	
docker_sar	11/24/2019 11:21 AM	File folder	
docker-vm	11/24/2019 11:16 AM	File folder	



This folder has/needs

- all the .py scripts
- all the uavsar mlc .zip files (one flightline at a time)

Share View

> This PC > superstore (D:) > docker_sar

Name	Date modified	Type	Size
docker_new_runs	11/24/2019 11:21 AM	File folder	
NISARA_22802	11/24/2019 11:27 AM	File folder	

This folder has

- all the data pertaining to flightline 22802
- this includes the uavsar mlc .zip files that were processed

Directory Structure



NISARA_22802

Share View

> This PC > superstore (D:) > docker_sar > NISARA_22802

Name	Date modified	Type
0_make_ann_dem	11/24/2019 11:25 AM	File folder
1_do_coreg_only_on_HHHH	11/24/2019 11:27 AM	File folder
2_resampdir	11/24/2019 11:29 AM	File folder
3_postprocess_stacks	11/24/2019 11:29 AM	File folder
merged	11/24/2019 11:25 AM	File folder
offsets	11/24/2019 11:27 AM	File folder
SLC	11/24/2019 11:25 AM	File folder

This folder has results from 0_ann_dem.py scrip

- the digital elevation model
- the source UAVSAR _mlc.zip files
- a log of what was already processed "processed.txt"

These folders only store data temporarily and contain their respective .py scripts.

- Don't delete them or the script won't work

This folder has the postprocessed data generated by the 3_uavsar_pp_mlc.py script

- each flightline/date has its own folder
- each has six postprocessed mlc files
- each has the original .ann with new col/row # appended
- Optionally, if geocode = 1 it has GTiffs, UTM coordinate
- Optionally, if complexmag = 1, complex valued -> real valued

These folders are organized in line with the ISCE stack processor

'merged' has the outputs of 'topo.py'

- incidence angles, simamp, lat, lon

'offsets'

- has the pixel offset in range/azimuth per slave image
- needed for making the stack

'SLC'

- has a copy of the HHHH pol mlc file (renamed .slc)
- the .slc + 'data' file = unpacked ISCE image